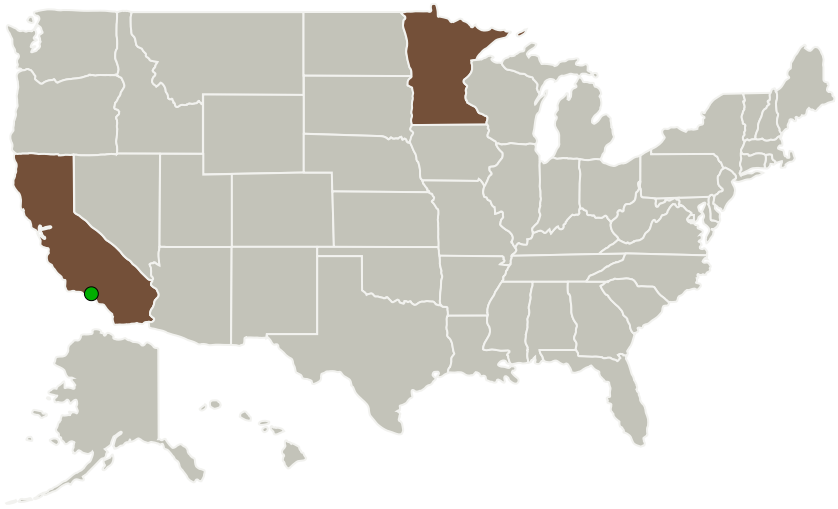
GaN Bulk Growth and Epitaxy from Ca-Ga-N Solutions, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

The innovations proposed here are Ka-band (38 GHz) group III-nitride power FETs and the dislocation density reducing epitaxial growth methods (LPE) needed for their optimal performance and reliability. Ka-band power transistors with >60% Power Added Efficiency (PAE) are not commercially available. The primary limitations to their manufacture are lack of mature process technology at major GaN foundries for sib-100nm lithography necessary for gate definition, and the difficulty of obtaining low dislocation density GaN templates in a suitable wafer size format (3-inch SiC and 6-inch Si) for mass production. Demonstration of Ka-band operation in the group III-nitrides has, to date, been primarily the realm of academic research labs. IIIAN's proposal bridges the gap between commercially available nitride foundry capabilities and pure research by utilizing proven process technology at RFMD for processes not requiring deep, submicron lithography and utilizing state-of-the-art nanofabrication technology available at the University of Minnesota's NanoFabrication Center.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
The IIIAN Company, LLC	Lead Organization	Industry	Minneapolis, Minnesota
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Minnesota

Project Transitions

June 2011: Project Start

May 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138890)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

The IIIAN Company, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jody J Klaassen

Co-Investigator:

Jody Klaassen

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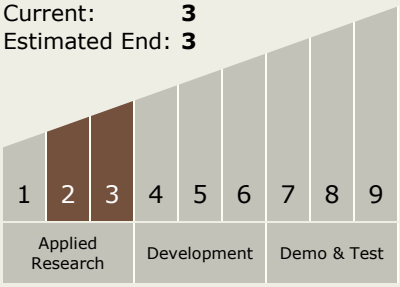
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.2 Power-Efficiency

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System